taires du mouvement de la Lune," *Par. Obs. Ann.* (*Mém.*) vol. xxi. 1892.

The work of Harkness (*m*) contains a collection of all the constants of astronomy and a full bibliography.

Haverford College: 1904 *January* 4.

The Parallactic Inequality and the Solar Parallax.

By Ernest W. Brown, Sc.D., F.R.S.

Of the principal solar terms in the Moon's motion the parallactic inequality is the only one whose coefficient can be determined correctly within 0″·1 when characteristics of order higher than the third are omitted. Like all the terms whose coefficients contain a/a' as a factor, the convergence of its coefficient along powers of m is slow, and consequently its value deduced from Delaunay's literal expression, even when allowance is made for higher powers of m, is not certain within half a second. The transformation of my theory to polar coordinates up to and inclusive of the terms whose characteristics are of order 3 was completed some time ago (*Monthly Notices*, 1899 December). As the coefficient of the parallactic inequality can be found, with a given set of constants, correctly to $\frac{1}{5000}$ of the whole from these terms it may perhaps be useful to give the result.

The following table gives the values of the various portions of the coefficient obtained by myself and Delaunay. It is expressed exactly in the form and with the constants of Delaunay, who uses a solar parallax of 8″·75. The column headed l.p. m. gives the value of the last power of m calculated by Delaunay. The result has not been multiplied by (E−M)/(E+M), the factor necessary to obtain the final value.

Coefficient of Parallactic Inequality.

Characteristic.	Brown.	Delaunay.	l.p. m.
$a/a'=\alpha$	−128″·069	−127″·621	−0″·381
$e^2\alpha$	− 2·485	− 2·378	− ·119
$e'^2\alpha$	− ·022	− ·024	+ ·001
$p^2\alpha$	+ 3·105	+ 2·772	+ ·354
α^3	− ·001	·000	− ·0004
Higher	...	+ ·009	+ ·009
Sum	−127·472	−127·242	...

My result is thus −127″·47 + higher terms. The latter, judging from Delaunay's calculation and the experience gained as to the

general rate of convergence of particular classes of terms, will give $+0''\cdot02 \pm 0''\cdot02$. Thus the coefficient is $-127''\cdot45 \pm 0''\cdot02$. Multiplying this by $(E-M)/(E+M) = 80\cdot15/82\cdot15$, and reducing to the parallax $8''\cdot790$, I find

$$\text{parallactic inequality} \doteq -124''\cdot92 \, \frac{\text{solar parallax}}{8''\cdot790} \sin D$$

with a possible error of $0''\cdot02$.

In the *Monthly Notices* for 1903 December Mr. Cowell finds $-124''\cdot75$ for the observed value of this coefficient. Comparing we obtain

$$\text{solar parallax} = 8''\cdot778.$$

Haverford College: 1904 *April* 1.

Some further Analyses of the Moon's Errors of Longitude, 1847–1901. By P. H. Cowell.

The columns 2–7 of the annexed table gives the "apparent" coefficient of $\sin 2\theta$, $\cos 2\theta$, $\sin(4D-2g)$, $\cos(4D-2g)$, $\sin D$ and the apparent error of semi-diameter as deduced from each of the forty-eight periods of analysis, consisting of 400 lunar days each, into which the period 1847–1901 has been divided.

Last month I explained how an apparent coefficient of $\sin\phi$ might in reality be due to a term $\sin(\phi \pm D)$. Periodicity in the apparent coefficient of $\sin\phi$ indicates a term different slightly in argument from ϕ or from $\phi \pm D$.

The angle θ is an auxiliary angle whose movement is $13^\circ\cdot5$ in a lunar day. θ therefore recurs in eighty days and 2θ in forty days; θ differs very slightly in movement from g, the mean anomaly, for the movement of g in 400 lunar days $= 13\cdot5 \times 400 + 9^\circ\cdot1681$. $4D-2g$ is double the evection.

The first four coefficients tabulated appear to be nearly, if not entirely, accidental. I cannot find any marked periodicity in any one of the four series. The conclusion from this is that the tables of Hansen contain either no error (with coefficient exceeding $0''\cdot3$ say) and argument $2g$, $4D-2g$, $2g \pm D$, $4D-2g \pm D$ or angles differing from any of the above by an argument of long period, such as $\omega-\omega'$ or 2ω, or that if an error in one term does exist, its apparent effect is cancelled (within a limit of about $0''\cdot3$) by another error in an allied term or errors in both the allied terms—an improbable supposition. Hansen's tables are therefore probably correct as regards terms of the above form. Subsequently I intend to give analyses of the allied terms $g+g'$ and $g-3g'$.

Apart from accidental error, therefore, I infer that all these